



Attorney Docket # 4136-212

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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Francis Edward FISHER et al.

Serial No.: 09/939,356

Filed: August 24, 2001

For: Heat Sink

Examiner: Leo, L. R.

Group Art: 3743

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KCooper
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REQUEST FOR RECONSIDERATION

SIR:

Responsive to the Office Action of September 3, 2003, reconsideration of the rejections therein is requested for the reasons following.

Claims 1 and 8 stand rejected as anticipated by Bollesen U.S. 6,125,037. This patent discloses a heat sink 112 having a continuous base 115 with upstanding fins 114 and torque bars 140. A thermal pad 116 made of an elastomer is bonded to the base by an adhesive. IC packages 104 are mounted on a circuit board 102 and bonded to the thermal pad 116, which transfers heat to the heat sink 112.

Bollesen does not disclose discrete solderable elements fixed to respective mounting lands. The pad 116 does not constitute at least two discrete elements and is not solderable. Therefore, Bollesen does not constitute an anticipation

Claims 1, 5, and 8 stand rejected as anticipated by Villaume U.S. 5,285,350. Villaume discloses a metal plate 20 which is formed with sides 12, 14 to which connectors 16 are attached at the ends. The surfaces 12, 14 are not coplanar with each other, neither surface constitutes a bottom surface, and neither surface alone constitutes two mounting lands. The connectors 16 (not numbered in the figures) each have a planar surface contiguous with a surface 12, 14, but do not have an opposed parallel surface for soldering to a circuit board. Rather, the connectors 16 are provided with pins received in holes in the circuit board. Unlike the thermally conductive solderable elements of the present invention, the connectors 16 of Villaume do not provide any substantial heat transfer function; this is provided by the semi-conductors 50 themselves. Accordingly, Villaume cannot constitute an anticipation of claim 1 (claims 5 and 8 will be discussed later).

Claims 1, 3-5 and 8 stand rejected as anticipated by Takahashi U.S. 5,528,456 (Figure 4). Figure 4B shows a thin metal plate which is pressed to have a corrugated structure, which in turn is soldered between circuit chips 1 and cap 7 by solder layers 10. Assuming arguendo that the bottoms of the V-profiles in the corrugation constitute mounting lands, there are no discrete thermally conductive solderable elements mechanically fixed to respective mounting lands. Accordingly, Takahashi does not anticipate claim 1 and therefore cannot anticipate claims 3-5 and 8 depending therefrom.

Claims 1, 3-5 and 8 stand rejected as anticipated by Pavlovic U.S. 6,055,158 (Figures 3-4). Lacking any claim reading exercise by the examiner, it is difficult for applicant to imagine how the disclosed structure might anticipate claim 1. These figures disclose a polymeric frame 30 in which heat transfer members 32 are embedded. The embodiment of Figure 3 shows upstanding fins 42 and center sections 38. Assuming arguendo that the sections 38 comprise coplanar bottom surfaces, there are no discrete elements having first planar surfaces which are contiguous with the bottom surfaces. The surfaces 40, which are for soldering to a component 18, lie opposite from surfaces which are spaced well away from the center sections 38. Accordingly, Pavlovic cannot anticipate claim 1.

Claims 1 and 8 stand rejected as anticipated by Katsui U.S. 5,689,404. This patent discloses a heat sink comprising a base 8 having upstanding fins 12, the base 8 being mounted to IC packages 4 and 6 on a PCB 2. An alternative embodiment, shown in Figure 6, shows a copper member 54 fixed to base member 56, but there is no suggestion of discrete elements mechanically fixed to respective mounting lands.

The examiner has not given any patentable weight to claim 8, which recites that the structure is extruded. The examiner refers to MPEP 2113, which states that "product-by-process claims are not limited to the manipulations of the recited steps, only the structure implied by the steps".

In the present case, the step of extrusion results in a structure which is different from the structure which results from other methods, e.g. forming the heat sink from a sheet of aluminum. In this regard, applicants find it anomalous that the examiner apparently has given patentable weight to claim 5 but has not given patentable weight to claim 8. An extruded product has a structure

which would readily be identified by one skilled in the art as extruded, and would not be confused with forming of sheet metal.

There is no easy way to describe an extruded structure other than to say it is extruded. The fact that it is necessary for an applicant to describe his product in product-by-process terms does not prevent him from presenting claims of varying scope. Ex parte Pantzer, 176 USPQ 141 (Bd. App. 1972). The examiner is again referred to MPEP 2173.05(p), which makes it clear that product-by-process claims are proper.

Claims 6 and 7 stand rejected as obvious over any of Villaume, Katsui, Pavlovic, or Bollesen in view Rosenbaum U.S. 2,965,819. The latter is cited for its disclosure of an anodized heat sink body, but adds nothing toward rendering claim 1 unpatentable.

Claims 9 and 10 stand rejected as obvious over Villaume, Takahashi, Katsui, or Pavlovic in view of Pei et al. U.S. 6,230,789. The latter discloses a heat sink 10 made by bending an aluminum base plate to form bottoms 14 having coplanar surfaces provided with holes 42 which receive studs 24 upstanding from a plate 22; the studs 22 are deformed to retain the plate 22 to the bottoms 14. As in the primary references, there is no suggestion of discrete thermally conductive solderable elements fixed to respective lands.

Only applicants disclose and claim a structure which permits soldering an aluminum heat sink body to a circuit board so that it straddles a component fixed to the board, without being fixed to the component. This problem is not addressed by any of the prior art. Claims 3 and 4, in particular, recite structure which makes the inventive heat sink device especially suitable for solving this problem. Only Takahashi and Pavlovic have been cited against these claims, yet are readily distinguished from claim 1.

The claims being definite and patentably distinguishable from the art of record, reconsideration of all claims, withdrawal of the rejections, and early allowance are requested.

It is believed that no fees or charges are required at this time in connection with the present application; however, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Respectfully submitted,

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